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BLUEBERRIES

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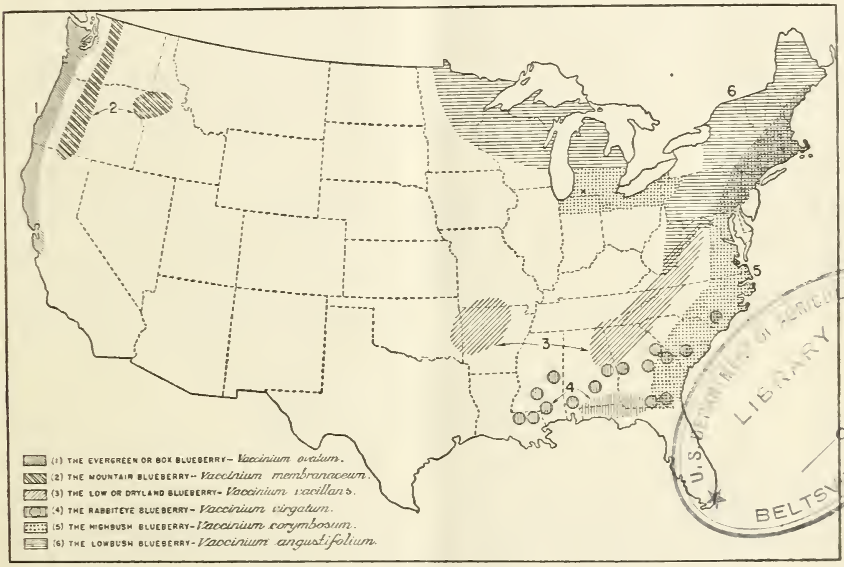
Important Species of Blueberries

The name "blueberry," as used in this leaflet, designates the group of plants, commonly called blueberries or huckleberries, that have many very small, soft seeds in contrast to the true huckleberries that have 10 large bony seeds. The seeds in the true huckleberry are objectionable in eating, whereas those of the blueberry are so small and soft that they are hardly noticed. However, many of the huckleberries are probably just as highly flavored as the blueberries and are gathered in considerable quantities from the wild. The blueberries are native in North America. They produce their fruit for the most part in clusters in contrast to related plants of Europe and Asia that produce their fruit singly or in twos. One important American species, the mountain blueberry (p. 3), bears its fruit singly.


1
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(1) THE EVERGREEN OR BOX BLUEBERRY– *Vaccinium ovatum.*
(2) THE MOUNTAIN BLUEBERRY– *Vaccinium membranaceum.*
(3) THE LOW OR DRYLAND BLUEBERRY– *Vaccinium vacillans.*
(4) THE RABBITEYE BLUEBERRY– *Vaccinium virgatum.*
(5) THE HIGHBUSH BLUEBERRY– *Vaccinium corymbosum.*
(6) THE LOWBUSH BLUEBERRY– *Vaccinium angustifolium.*

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Figure 1.—Areas in which the wild blueberry species are extensively harvested: (1) The evergreen or box blueberry; (2) the mountain blueberry; (3) the low or dryland blueberry (*Vaccinium pallidum (V. vacillans)*); (4) the rabbiteye blueberry; (5) the highbush blueberry; and (6) the lowbush blueberry.

The blueberries are wild fruits of increasing importance, and six types or species are marketed extensively in different regions in the United States. These are briefly discussed here, and the areas where they are gathered commercially are shown in figure 1.[1]

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[1] The author will appreciate it if anyone having information of commercial picking of native blueberries outside of the regions indicated on the map will notify him.

The lowbush blueberry,[2] the most important commercial species, is native to the northeastern part of the United States and parts of Canada. The annual value of the fruit harvested, all from native unplanted fields, is probably more than $5,000,000 and only a small portion of the total crop is harvested. In the United States it is gathered in commercial quantities from Maine to Minnesota, and southward in the Alleghenies to West Virginia. It is an upland species with fruit ripening earlier than that of the highbush blueberry. The fruit probably on an average is smaller than that of the highbush blueberry, but the flavor is similar.

The fruit is picked by hand for the fresh-fruit market, but for the canning trade it is gathered from the plants with a "rake" similar to but much smaller than the cranberry scoop. The plants are from 6 to 18 inches high and stool out by means of underground shoots into large colonies. No named varieties have been propagated for commercial planting. Selections have been made for breeding, for this species crosses readily with the highbush blueberry. Over an extensive area in eastern Maine some care is given to native stands. This includes burning over as a form of pruning and weeding, mowing or grubbing as a means of weed control, and dusting to control insects. Possibly 150,000 acres of wild blueberries in that region are given some care.

The highbush blueberry [3] is native from southern Maine to southern Michigan, and southward to southern Georgia. It is gathered from the wild most extensively in eastern North Carolina and to some degree throughout its range. The annual value of the crop from the wild is from $1,000,000 to $1,500,000. The value of the cultivated crop in 1938 was about $400,000. The highbush blueberry is a native of swamps, and of moist woods, and also of moist fields at high elevations. It grows from 10 to 15 feet in height and does not stand drought well. From this species have been selected the wild forms of large size that have been hybridized to produce named varieties. Most of the discussion in this leaflet refers to the culture of varieties of this species.

The dryland blueberry,[4] commonly called "low huckleberry," is important in northern Alabama and Georgia, and northward to Maryland and West Virginia. It is gathered extensively in northeastern Alabama and northwestern Georgia, and western and northwestern Arkansas. The annual value of the crop may average $300,000 and in some years is much more. This dryland blueberry grows from 1 to 2 feet in height and spreads in colonies much as does the lowbush blueberry. It probably averages later in ripening than either the lowbush or highbush, and is sometimes called the "late" blueberry. No varieties have been named and introduced. It does not cross with the highbush blueberry.

The evergreen blueberry [5] is native along the Pacific coast from central California to British Columbia, and the fruit is gathered extensively in northern California and in the Puget Sound region. Its branches are important commercially for decorative purposes, being shipped by the carload to eastern cities under the name "evergreen huckleberry." The annual value of the fruit crop may be $150,000

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[2] *Vaccinium angustifolium* Aiton.

[3] *Vaccinium corymbosum* Linn.

[4] *Vaccinium pallidum* Aiton (*V. vacillans* Kalm.)

[5] *Vaccinium ovatum* Pursh.

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to $200,000, and that of the branches an equal amount. The evergreen blueberry grows only in the mild climate near the Pacific coast and around Puget Sound; it is not hardy in Maryland. It may reach a height of 20 feet in open woods. No commercial plantings for fruit are known. The berries ripen from August to November, the chief shipments being made in September and October. The berries on an average are small, are usually shiny black, and have a characteristic aroma not at all like that of either the lowbush or the highbush blueberries.

The mountain blueberry [6] is a native of the high slopes of the Cascade Mountains of Oregon and Washington, and eastward toward Wisconsin, and is particularly important near Mount Hood, Mount Adams, and Mount Rainier. It is one of the very drought-resistant plants, maturing in late summer even after 3 or 4 rainless months, and is an important forage plant for livestock. It is one of the best flavored and the largest fruited of all wild blueberries in the United States. The annual value of the fruit crop may total $200,000. Because its berries are borne singly or in twos rather than in clusters, as are the other blueberries,[7] the individual bushes are not highly productive, and no cultivated plantings are known.

The rabbiteye blueberry [8] is native in southern Georgia and Alabama, and in northern Florida. It is harvested from the wild to a limited extent, but is chiefly important because about 3,500 acres located mostly in northwestern Florida, but also in North Carolina and South Carolina, Georgia, Alabama, Mississippi, and Louisiana, have been devoted to raising this species, the plants having been transplanted from the wild into commercial fields. No figures on the value of the crop of this blueberry are available.

Cultivated Blueberries

Highbush Varieties and Culture

In 1906 the late F. V. Coville began experiments in the culture of the highbush blueberry. Selections were made in the wild, and breeding work was begun in 1909. Elizabeth C. White, of New Jersey, made additional selections of wild plants and in cooperation with Dr. Coville established the first commercial plantings of hybrid blueberries. The breeding work has continued since 1909 and the best of the selections have been propagated and named.

Formerly several selections from the wild were grown commercially, but now only the Rubel of that group is considered of sufficient value to be planted, and many growers consider Stanley, Jersey, Wareham, and Dixi better varieties than Rubel of the same season. Breeding has produced berries three times the size of the best wild blueberry. All varieties other than Rubel now being planted commercially are the result of the breeding work of Dr. Coville. All are of pure highbush parentage except Rancocas and June, which are backcrosses of a selection from a lowbush-highbush cross with Rubel.

CHARACTERISTICS OF VARIETIES

About 12 varieties make up the cultivated plantings. Information on the merits of these is somewhat limited, but the following discussion and the information in table 1 may give an idea of their relative qualities.

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[6] *Vaccinium membranaceum* Douglas (= *V. macrophyllum*).

[7] Blueberries bearing their fruit singly are sometimes called "whortleberries."

[8] *Vaccinium virgatum* Aiton.

In New Jersey the Cabot, June, and Weymouth varieties are planted for early season fruit; Rancocas and Concord for midseason fruit; and Stanley, Jersey, and Dixi for the later season. Nearly all New Jersey growers have discarded the Katharine as a commercial sort because the skin about the stem tears too badly when picked, and the Pioneer because it is insufficiently hardy, is unproductive, and is more subject to mildew than any other variety. Adams also has been discarded as a commercial variety, but it is especially vigorous on upland soils and is a worth-while variety for the home garden. Cabot matures over a long season. Although the berries are large at the first pickings, the fruit in general is small and cracks badly in wet weather. The bush is low and spreading. The June variety is slightly earlier than Cabot and matures all its fruit in a short period. The berries are somewhat lacking in flavor. The bush is erect, but the foliage is rather weak. Weymouth, a cross between June and Cabot, is earlier and bears larger fruit than either. No commercial plantings have as yet come to full bearing age. Concord is a midseason variety that matures all its fruit in a short period but will hold it on the bush for a long time. The clusters are only medium in size, so that the fruiting shoots do not need to be cut back when the bush is pruned. The bush is erect and vigorous and the berries are of good size, of good flavor, but do not pick easily or keep well. The Rancocas is also a midseason variety. The berries crack badly in wet weather; they are fair in flavor. This variety has a tall bush with slender branches, is a dependable producer, and is relatively easy to propagate. The Stanley is a midseason to late variety, has the highest aroma of any variety now known, and is generally considered at present the best of all varieties in quality. The bush is vigorous, productive, and easy to prune. The berries are large, but they become small at the end of the season.

Table 1.—*Blueberry varieties ranked approximately in order of importance with reference to certain characteristics of ripening, size of berry, and dessert quality*

Rank	Season (early to late)	Size of berry (large to small)	Dessert quality (good to poorer)	Color (light to dark blue)	Shipping quality (good to poorer) [1]	Cold resistance (hardy to tenderer) [1]	Bush shape (erect to spreading)
1	Weymouth	Dixi	Stanley	Stanley	Jersey	Wareham	Rubel.
2	June	Weymouth	Wareham	Jersey	Rancocas	Jersey	June.
3	Cabot	Jersey	Pioneer	Concord	Rubel	Stanley	Concord.
4	Rancocas	Wareham	Dixi	Pioneer	Scammell	Concord	Scammell.
5	Pioneer [2]	Stanley	Scammell	Rubel	Pioneer	Rubel	Weymouth.
6	Concord	Concord	Concord	Dixi	June	June	Wareham.
7	Scammell [3]	Scammell	Rancocas	Rancocas	Stanley	Rancocas	Rancocas.
8	Stanley	June	Cabot	Cabot	Wareham	Scammell	Dixi.
9	Dixi	Rancocas	Weymouth	Weymouth	Cabot	Cabot	Jersey.
10	Rubel	Cabot	Rubel	Scammell	Concord	Pioneer	Stanley.
11	Jersey	Pioneer	Jersey	June			Pioneer.
12	Wareham	Rubel	June	Wareham			Cabot.

[1] The Dixi and Weymouth are too new for their shipping quality and cold resistance to be estimated accurately.

[2] Pioneer in Michigan ripens with or later than Stanley.

[3] Scammell ripens later than Stanley in New Jersey.

The Rubel ripens a little later but over a longer season than the Stanley and has been a dependable variety. The berries ship well if they are not overripe. They have good color, but are small and of only fair flavor. The Jersey is later than the Rubel in ripening its first berries and usually matures over a slightly longer season. The berries are larger than any sort except the Weymouth and Dixi varieties; however, the flavor is only fair. The bush is upright and vigorous but makes few shoots and needs more fertilizer than some other varieties. Dixi is late in season, about with Jersey and Rubel, but has very large fruit. It has good flavor, and the bush is vigorous and seems to be exceptionally healthy.

In Massachusetts there are a few commercial plantings. Cabot, Pioneer, Stanley, Rubel, Jersey, and Wareham are fairly successful; however, Pioneer and Cabot are not fully hardy and Concord has made a poor growth at Wareham, Mass. The Wareham is the latest of these varieties, ripening a week after the Rubel and slightly later than the Jersey. It is vigorous and productive and of very high flavor, ranking above most varieties except the Stanley. Its color is a dark blue. Late varieties such as Stanley, Rubel, Jersey, and Wareham are considered more profitable than other sorts.

In Michigan the late varieties are also more profitable than the early ones. Stanley and Pioneer are considered desirable as midseason and Rubel and Jersey as late varieties.

In North Carolina, Cabot, Scammell, and Rancocas have been extensively planted. The Scammell has been the most satisfactory because of its vigor, its disease resistance, and its productiveness. Its chief drawback is that it is a midseason instead of an early variety. Growers would like early varieties of the season of Cabot and June. Cabot is subject to a canker disease and is not very vigorous. The Weymouth is being tested, and Concord and Stanley are liked.

In western Oregon and Washington, Cabot, Pioneer, Concord, Stanley, Rubel, and Jersey are known to succeed.

REGIONAL AND SOIL ADAPTATION

The cultivated highbush blueberry is raised commercially from eastern North Carolina northward to southern New England; also in New York, southern Michigan, and in western Oregon and Washington. The estimated acreage of bearing and nonbearing bushes in 1939 was 1,045 acres in New Jersey, 200 acres in North Carolina, 200 acres in Michigan, and 100 acres in all other States. The plant is probably not hardy north of central Maine and central Michigan, and for present varieties probably the winters south of central Georgia are not sufficiently cold for breaking the rest period.

The blueberry is found in the wild only where the soil is quite acid. Usually the best growth occurs where the acidity ranges from 4.5 to 5.0 pH. Good growth often occurs in soil with a pH value as low as 4.0. Cultivated plantings have succeeded on acid soils having ample moisture. The best indication that blueberries will succeed on a soil is that they or some of their relatives, such as huckleberries, azaleas, or laurel, are found growing on the soil. Open porous soils, such as a sand-peat mixture with an admixture of loam with the water table 18 to 30 inches below the surface, have been found best for blueberries.

Blueberries do not succeed and soon die in ordinary rich garden soils. For small garden plantings oak leaves or acid peat mixed in soils lacking in acidity help to make the conditions suitable. Mulching with leaves, sawdust, hay, or straw may help to retain moisture. The use of ammonium sulfate at the rate of about one-quarter of a pound per bush will often cure the chlorotic color of the leaves or start vigorous growth where the plants are not growing well.

PLANTING AND CULTIVATION

The plants are usually set 4 by 8 feet, 4 by 10, 5 by 8, or 6 by 8, and as early in the spring as the soil becomes suitable for working. In New Jersey some early fall planting is done. The blueberry is shallow-rooted; therefore cultivation should be shallow. Clean cultivation has been the usual practice, but because of danger of erosion and of soil impoverishment it is not advisable as a permanent practice. In Michigan an oat covercrop sown just after the harvest is recommended. Lespedeza, annual bluegrass, and mulching are being tested in New Jersey.

FERTILIZERS AND SOIL FERTILITY

The essential requirements for successful blueberry culture are that the plants be vigorous and produce good crops each year. On fertile soils very little fertilizer may be required; on poor soils larger amounts may be necessary to maintain satisfactory growth. In Michigan superphosphate up to 670 pounds an acre has given good results. In New Jersey and North Carolina, in localities where blueberries are now planted, nitrogen has seemed most often the limiting element. It is suggested that one application, 400 to 600 pounds an acre, of a complete fertilizer (about 5–10–5) be made in the spring when buds are starting. This should be followed by an application of about 150 pounds of nitrate of soda or calcium nitrate about 6 weeks later if the soil is quite acid, or an equivalent amount of sulfate of ammonia (110 pounds) if the soil is not very acid, and then one or two more applications at intervals of 6 weeks. The more fertile fields should not have the later fertilizer applications.

PRUNING

The blueberry produces fruit on wood of the previous season's growth. The largest fruit is borne on the most vigorous wood. Most varieties tend to overbear, and unless part of the fruit buds of such varieties are pruned off the berries will be relatively small. The purposes of pruning, therefore, are to obtain vigorous new shoots each year and to reduce the number of fruit buds so that the greatest quantity of large berries can be obtained year after year. If the plants are heavily fertilized and the soil moisture supply is adequate at all times, the plants make much stronger growth and can produce a much heavier crop of large berries than if fertility is lacking and the soil moisture supply insufficient at times.

Usually very little pruning is necessary for the first 3 years after planting. At the end of the third season regular annual pruning should ordinarily begin. First, the low spreading branches next to the ground should be cut out, leaving only the erect branches or shoots. Second, if the center of the bush is dense the weak and the older branches at the center should be cut out. The erect-growing varieties such as Rubel, Rancocas, Scammell, June, and Concord need to be thinned at the center, whereas Cabot and Pioneer are spreading and are likely to need to have the lower drooping branches pruned off. Third, many of the slender small branches should be removed, leaving the strong branches and shoots. Many, sometimes nearly all, of these slender branches have no fruit buds and if they do, such buds are weak. Furthermore, these weaker branches cause the bush to become too dense, thus making picking difficult and leaving inadequate space for strong new shoots. Rubel and Concord bushes require much thinning out of the small branches and are therefore expensive to prune.

Finally, in order to increase the size of the berries the fruiting shoots of some varieties should be cut back, the amount depending on the crop and the number of fruit buds on such shoots. Rancocas, Concord, and Rubel require very little cutting back; Cabot and Pioneer require cutting back to about three to six fruit buds per shoot. The amount of necessary cutting back varies from year to year, depending on growing conditions, and it is usually done after danger of cold injury is past. General pruning may be done at any time from leaf fall in the autumn to the beginning of growth in the spring.

HARVESTING AND MARKETING

The first berries from the early varieties are picked about May 20 in North Carolina, June 20 in New Jersey, and July 10 in southern Michigan. From three to seven pickings of a given variety are made at 5- to 7-day intervals. To provide the best possible supply to the markets, the North Carolina growers are mainly interested in early to midseason varieties, the New Jersey growers in midseason and late sorts, and the Michigan growers in very late sorts. Records of yields vary greatly; in Michigan on good soil the yields from the second to the sixth year were 25, 100, 1,000, 2,000, and 3,000 quarts per acre, respectively. Larger yields are possible and have been obtained. Full production is reached in 6 to 10 years. In 8 hours pickers can harvest 30 to 40 quarts or more where the crop is heavy. Most of the crop in the three States mentioned is marketed cooperatively. The berries are sold according to size grades.

Rabbiteye Varieties and Culture

The rabbiteye blueberry, although native to river valleys and the edges of woods, stands open-field culture better than the highbush blueberry and survives the higher temperatures and droughts of the Southern States. For this reason it is especially desirable as a home-garden fruit in the South. The plants may grow to a height of 15 feet with a spread of 17 feet. In the field they are set 15 by 15 feet.

The fruit of rabbiteye blueberry ripens later and over a longer season than that of the highbush and dryland types. Some varieties of rabbiteye blueberry ripen most of their fruit within a 30-day period, whereas other varieties mature fruit over a 3-month period, extending into September. The largest-fruited selections of rabbiteye blueberry are probably as valuable for commercial purposes as the best selections from the wild of the highbush blueberry; they are juicy and firm-fruited and have good flavor. The Black Giant, Owens, Ruby, Locke, Myers, Scott, and Hagood are some of the better named selections from the wild that have been propagated. Myer is one of the best flavored. The Black Giant is early and large and fruits for nearly 60 days and is one of the largest in size of bush. The Hagood is early and has a long season. The Locke suckers rather freely and has a very tall bush. The Owens also is tall growing and has a very long season. The Ruby has good bluish berries of large size, but they have grit cells and are not considered so well flavored as those of the previously mentioned varieties. Other named varieties that have been propagated are Mineola, Sapp Early, Anne, Jean, Suwanee, and Okaloosa (very late). Sapp Early is early, ripening its fruit in a short period of time. It seems to need only a very short rest period, and its buds may be killed by late frosts. The rabbiteye varieties are suggested for trial for home use and local market from eastern North Carolina to Louisiana and southward to northern Florida. Limited tests for general market might be made in the same area.

Propagation

The blueberry may be propagated by both hardwood and softwood cuttings. The hardwood cuttings are made 4 to 6 inches long from shoots of the previous season's growth, the lower cut being made just below a bud and the upper cut just above a bud. Wood with fruit buds should be cut off and discarded. The cuttings are rooted either in ground beds with lath shade about 7½ feet above the ground or in closed frames. Ground beds are usually filled with a mixture of half peat and half sand to a depth of about 6 inches. The most commonly used closed frame is 6 feet long by 27 inches wide, 16 to 40 inches deep, and contains a tray 4 inches deep with the bottom made of ⅛- to ¼-inch mesh hardware cloth or fly screen. The tray rests on cleats 8 to 10 inches below the top. It is filled with peat, and the cuttings are placed about 1 inch apart in rows 2 inches apart and in a slanting position. In Michigan the frame is covered with a sash and then with coarse burlap, and in New Jersey slat frames are used for shade. The cuttings are made while the plants are dormant and are placed in the propagating beds as early as possible in the spring. They are usually rooted by June.

Softwood cuttings are made when the first secondary growth appears on the new shoots. They are made about 4 inches long, and the two upper leaves are left on the cutting. The apex half of the two leaves is usually cut off to reduce transpiration. In Michigan, softwood cuttings are handled in the same manner as are the hardwood cuttings in frames, and in New Jersey they are propagated under glass; however, softwood cuttings are little used in New Jersey.

Both hardwood and softwood cuttings are usually grown for a year in the nursery row before being planted in the field.

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